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(71) Applicant: HEDEMORA ENGINEERING LIMITED
15 Princewood Road
Corby, Northants, NN17 2AP(GB)

(72) Inventor: Johansson, Sven Arne
Munkbrogatan 33
S-77600 Hedemora(SE)

(74) Representative: Archer, Philip Bruce et al
Urquhart-Dykes & Lord Trinity Court Trinity Street
Peterborough Cambridgeshire PE1 1DA(GB)

(54) Floor assemblies.

(57) A floor assembly (10) providing a floating floor structure to minimise noise generation and/or propagation, comprises a primary or lower floor (18) on which a secondary or upper and floating floor (12) is mounted by means of isolation means (16) inserted between the floors. The isolation means (16) comprises zones (20) of an open cell foamed flexible ploymeric material. The zones (20) are spaced apart by free zones (22) in which the floating floor is unsupported. In contrast to the standard approach to acoustic insulation and lowering of frequencies at which resonance occurs by increasing the mass of material present, this provision of free or unsupported zones (22) of the floating floor nevertheless lowers the resonance frequency and improves performance while reducing consumption of materials.

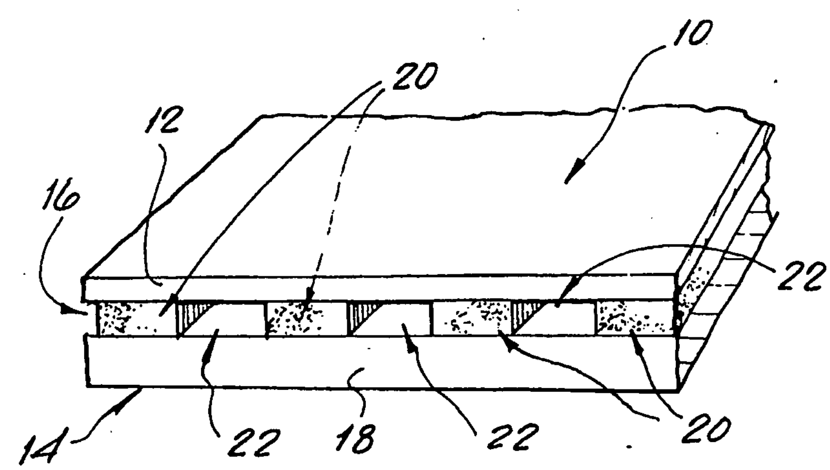

FIG.1

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This invention relates to floor assemblies. More particularly, the invention relates to floor assemblies in which an upper or floating floor structure is supported on non-rigid material to reduce noise generation and/or propagation.

It has been previously proposed to solve acoustic problems by using a floating floor in which the floating upper or secondary floor layer is supported on a non-rigid layer which provides a degree of isolation or damping. This non-rigid layer is placed on top of the lower or primary floor, which has to be acoustically improved.

In one prior proposal, the non-rigid material provided for isolation purposes comprises mineral wool. This material is by no means satisfactory for this purpose. Its shortcomings include its non-uniform nature, which renders installation difficult and leads to mistakes. Furthermore, it is necessary for the mineral wool layer to be between 50 and 150 millimetres in thickness in order to produce the necessary acoustic isolation. This makes the entire floor assembly rather space-consuming and can be a serious problem for installation in certain buildings such as flats. A further factor concerns the resonance frequency of the floor. This frequency tends to be somewhat high in the case of the use of mineral wool. Morever, this effect is accentuated by the increasing stiffness of mineral wool under load.

An object of the present invention is to provide a floor assembly offering improvements in relation to one or more of the matters discussed above, or generally.

According to the invention there is provided a floor assembly as defined in the accompanying claims.

In a preferred embodiment the isolation means comprises an open cell foamed flexible polymeric material available under the name Stepisol. This material is provided in spaced strips, which thus do not cover the entire primary or lower floor. This results in a lowering of the frequency at which resonance occurs, and a reduction in the stiffness of the construction, but not to the extent that the upper or secondary floor is felt to be "soft". Moreover, although the foamed flexible polymeric material may be somewhat more costly than mineral wool, by using this material in spaced zones, the cost of the material is significantly reduced. Moreover, the provision of spaced zones using conventional mineral wool would be extremely difficult.

In the embodiment, the foam flexible polymeric material has a density of 80 to 190 kilograms per cubic metre and a thickness of between 10 and 100 millimetres. The strips or zones are from 50 to 300 millimetres in width (measured horizontally). The sum of the widths of the strips may be from 30 to 90 per cent of the width of the total floor layer. The secondary or upper floor can be board, chipboard, plywood or even concrete slabs provided in thickness of between 10 to 50 millimetres.

In a modification, the foamed flexible polymeric material is provided between floor support beams and a single primary floor, again arranged in strips having lengths of 100 to 1000 millimetres and with cross-sectional dimensions of 5 to 20 millimetres depth (measured vertically) and 25 to 100 millimetres width (measured horizontally).

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which :-

Fig 1 shows, somewhat diagrammatically, an end perspective view of a floor assembly comprising a lower primary floor and an upper secondary floor separated by zones of isolating material; and

Fig 2 shows a second embodiment, being a modification of the embodiment of Fig 1, in which the isolating material is provided in strips between support beams and a primary floor layer.

As shown in Fig 1, a floor assembly 10 comprises structure 12 forming an upper or secondary floor area for use within a building, support means 14 for floor 12, and isolating or damping means 16 comprising a non-rigid material inserted between floor 12 and support means 14.

Considering now the above main structural items in turn, floor 12 is simply an upper floor structure, floating on the isolating means 16, and may be formed of board, chip-board, or any other suitable flooring material. There is provided around the perimeter of floor 12 an edging (not shown) of flexible (preferably elastomeric) material sealing the floor to the walls (not shown) of the surrounding building.

Support means 14 for floor 12 comprises a lower floor 18, for example of board of chip-board or the like, and mounted on beams (not shown) forming part of the building in which it is located.

Isolating means 16 comprises zones 20 of an open cell foamed flexible polymeric material. In this embodiment, the material is that which is available under the name Stepisol in which the polymer is polyethylene, and the material is formed by chopping the foam and then reconstituting it by bonding the chopped particles. The cells of the foam are of microscopically small dimensions. Other open cell foamed polymeric materials could be employed. It is desirable that the spring stiffness or resilience of the material should be as close as possible to that of air (or other suitable gas) trapped in the closed cells.

As shown in the drawings, the zones 20 of polymeric material are spaced apart by free zones 22 in which the floor 12 is unsupported. The zones 22 extend longitudinally in generally parallel relation, with the zones 22 between them. However,

the pattern of application of the isolating means may be varied provided that the proprtions of supported and unsupported areas are maintained and given uniform coverage of the whole area. Zones 20 are of generally rectangular cross-sectional shape and are formed by cutting, for example sawing, a block or mass of the Stepisol material. The latter has a density of between 80 and 190 kilograms per square metre. The zones 20 have a cross-sectional width (measured generally horizontally) of between 50 and 300 millimetres, and a depth (measured generally vertically) of 10 to 100 millimetres.

The sum of the widths (measured generally horizontally) of the zones 20 for a given floor area is from 30 to 90 per cent of the total width of the floor area.

The zones 20 of polymeric material can be secured in position by bonding, or by fasteners, or otherwise, to the upper and/or lower floor layers 12, 18.

In the embodiment of Fig 2, the floor layer 30 (corresponding to floor 12 above) is supported on zones 32 of Stepisol or like polymeric material, which are spaced apart by free zones 34, the general arrangement of these parts being somewhat similar to that of Fig 1, but with somewhat less vertical depth or thickness in the polymer zones, which are also somewhat wider, and with somewhat wider free zones between them.

However, in place of the lower or primary floor 18, the zones 32 are supported directly on beams 36, with the polymer zones extending generally transverse to the floor support beams.

In operation, both these embodiments function in a similar manner, achieving significant acoustic attenuation by virtue of the floating mounting of the floor layer by virtue of the zones of open cell foamed polymeric material.

Interestingly, the above embodiments provide a floating floor assembly which is relatively simple to construct, and uses less material than prior proposals while achieving a lowering of resonance frequency and hence improved acoustic performance, by adopting an approach which is contrary to the well-established teachings of providing increased mass and extra support to lower resonance frequencies. The zones or strips of polymeric material are readily cut to size and simply assembled. The free zones between them save significant amounts of material. The performance of the whole is significantly better than could have been predicted by existing teachings.

Claims

1 A floor assembly comprising :-

a) structure forming a floor area for use within a building;

b) support means for said structure;

c) isolating means comprising non-rigid material inserted between said structure and said support means to reduce noise generation and/or propagation;

characterised in that

d) said isolating means comprises zones of an open cell foamed flexible polymeric material; and

e) said zones being spaced apart by free zones in which said structure forming a floor is unsupported.

2 A floor assembly characterised by isolating means comprising zones of an open cell foamed flexible polymeric material.

3 A floor assembly according to claim 1 or claim 2 characterised in that said zones of foamed flexible polymeric material extend longitudinally in generally parallel relation with said free zones between them.

4 A floor assembly according to any one of the preceding claims characterised by said zones of foamed flexible polymeric material being generally rectangular in cross-sectional shape and being formed by cutting, for example sawing, a mass of said foamed flexible polymeric material.

5 A floor assembly according to any one of the preceding claims characterised by said foamed flexible polymeric material comprising chopped particles of foam which have been re-constituted by bonding.

6 A floor assembly according to any one of the preceding claims characterised by said polymeric material comprising polyethylene.

7 A floor assembly according to any one of the preceding claims characterised by said foamed flexible polymeric material having a density between 80 and 190 kilograms per cubic metre.

8 A floor assembly according to any one of the preceding claims characterised by said zones of foamed flexible polymeric material having a cross-sectional width (measured generally horizontally) of between 50 and 300 millimetres, and a depth (measured generally vertically, in use) of between 10 and 100 millimetres, and the sum of the widths (measured generally horizontally, in use) of said zones of foamed flexible polymeric material for a given floor area being 30 to 90 per cent of the total width of said floor area, and preferably 40 per cent and 60 per cent of said total width.

9 A floor assembly according to any one of the preceding claims characterised in that said support means for said structure forming said floor comprises a primary floor located below said structure.

10 A floor assembly according to any one of claims 1 to 8 characterised in that said support

means for said structure forming said floor comprises spaced floor support beams with said foamed flexible polymeric material extending laterally across said beams and being located between the beams and said structure forming said floor.

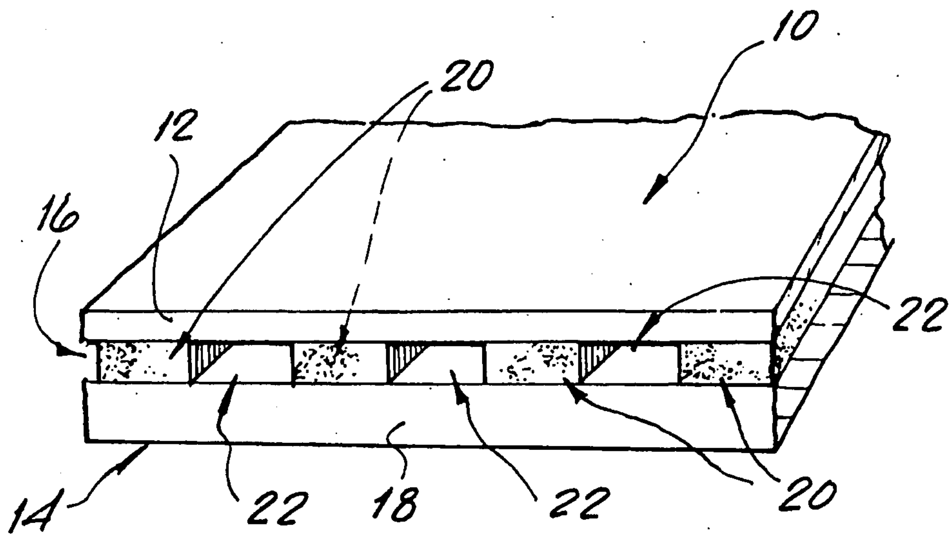

FIG.1

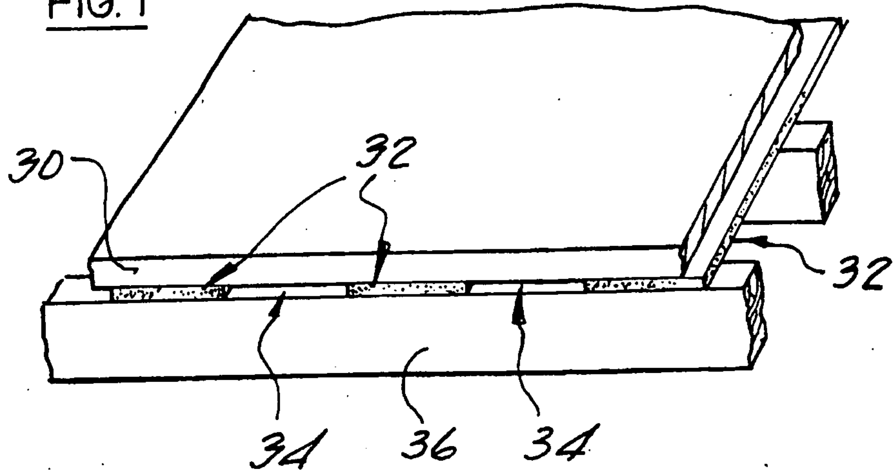

FIG.2

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EUROPEAN SEARCH REPORT

Application Number

EP 90 30 5043

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y A	GB-A-2196356 (MACKENZIE) * page 1, lines 5 - 62; figure *	1, 2, 9 3, 7 4, 6	E04F15/20
Y A	US-A-3085482 (YAKUBIK) * column 2, line 11 - column 3, line 43; figures 1-4 *	3 1, 2, 9	
Y A	DE-A-2659551 (DYNAMIT NOBEL AG) * page 6, line 18 - page 7, line 9 * * page 10, line 4 - page 12, line 2; figures 1-3 *	7 1, 2, 6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 AUGUST 1990	AYITER J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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